

## PATENT ABSTRACTS OF JAPAN

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(21)Application number : 09-125572

(71)Applicant : HONDA MOTOR CO LTD

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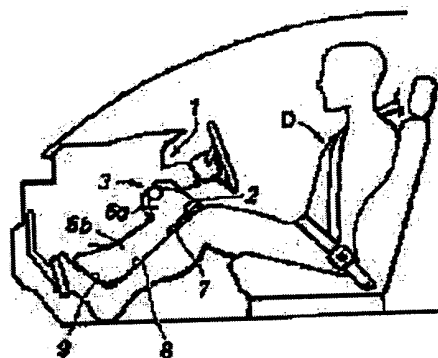
(72)Inventor : YAMADA TAKAYUKI

## (54) AIR BAG DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To protect an occupant from his knees to shins and further to around ankles.

SOLUTION: An air bag device 3 which inflates in the event of car collision and constrains the movement of an occupant D, is equipped with a sack 6 (6a and 6b) inflating so as to fill the void between the mating surfaces of the occupant knees 2, shins 8 and insteps 9 and the instrument panel 1 of the car. Thereby the lower legs are prevented from directly colliding with the instrument panel by the inflated sack, and also the ankles are precluded from unreasonable bend as the angle between each instep and shin is fixed by the inflated sack. If in particular, the sack is formed as movable together with the lower legs while the ankle angle is held when a specified load is applied to the soles, the lower legs can make follow-up motions after deformation of the car body with the ankle angle remaining fixed even if the lower legs are thrust up by the deformation of the car body, so that the load applied to the shins can be released in favorable degree.



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CLAIMS

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[Claim(s)]

[Claim 1] Air bag equipment which is air bag equipment which expands at the time of the collision of a car and restrains migration of crew, and is characterized by having the bag body which expands so that the opening between the mutual opposed faces of crew's knee, the shin and the shell of a guide peg, and an instrument panel may be filled.

[Claim 2] Said bag body is air bag equipment according to claim 1 characterized by being movable with a leg, with the include angle of an ankle held, when a predetermined load joins the sole.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to air bag equipment aiming at protection of crew's leg section especially about the air bag equipment which expands at the time of the collision of a car and restrains migration of crew.

[0002]

[Description of the Prior Art] Crew may move to the front with inertial force at the time of the collision of a car, and a knee may be dashed against an instrument panel. In order to protect crew from such a blow, the air bag equipment which bulges from the inferior surface of tongue of an instrument panel is proposed (reference, such as JP,48-5134,A).

[0003]

[Problem(s) to be Solved by the Invention] However, although an actual collision thing, therefore the actual example where the floor of a car body deforms with an impact, a pedal projects, and an ankle is bent by the impossible include angle if it is seen, since the above-mentioned conventional air bag equipment aims at obtaining the cushion function to prevent that a knee runs against the instrument panel which is the rigid body directly, it cannot protect an ankle from a collision impact.

[0004] This invention is thought out so that it may cancel the fault of such a conventional technique, and the main purpose is in offering the air bag equipment which can protect even the shin and near the ankle from a knee.

[0005]

[Means for Solving the Problem] In order to achieve such a purpose, in this invention, it shall have the bag body 6 which expands the air bag equipment 3 which expands at the time of the collision of a car and restrains migration of Crew D so that the opening between the mutual opposed faces of crew's knee 2, the shin 8 and the shell 9 of a guide peg, and an instrument panel 1 may be filled. Since being prevented by the bag body with which it expanded that crew's leg section runs against an instrument panel directly becomes the form fixed from the first with the bag body with which the include angle of the shell of a guide peg and the shin expanded according to this, an ankle does not need to be bent by force.

[0006] Since the leg section can follow car-body deformation while the include angle of an ankle had been fixed even if the leg section is thrust up by deformation of a movable thing, then a car body with the leg section 13, with the include angle of an ankle held if a predetermined load joins the configuration of claim 2, i.e., the sole, especially in a bag body, the load which joins the shin can be missed suitably.

[0007]

[Embodiment of the Invention] Hereafter, the configuration of this invention is explained to a detail with reference to one example shown in the attached drawing.

[0008] Drawing 1 shows the condition that crew sat down to the driver's seat to which this invention was applied. The air bag equipment 3 by this invention is attached in Crew's D knee region 2 in an instrument panel 1, and the part (a near steering column) which counters. This air bag equipment 3 of a basic configuration is the same as that of the thing of the well-known format included in a steering wheel, and as shown in drawing 2, it consists of a box-like retainer 4, and the inflator 5 and air bag 6 which were held in the retainer 4. Moreover, the effective area of a retainer 4 is closed by

the flat lid 7 used as the inferior surface of tongue of an instrument panel 1, and the same field.  
[0009] The air bag 6 is held in the retainer 4 in nothing and the condition of usually having been folded up, in saccate. The air bag 6 consists of part II part 6b which divides roughly and follows part I part 6a near an inflator 5, and part I part 6a, as it combines with drawing 3 and was shown, part I part 6a is folded up in general in the shape of bellows, and part II part 6b is folded up in the shape of a \*\* face chip box.

[0010] Next, the actuation point of this invention equipment is explained. If a car collision is detected by the decelerating sensor (not shown), the generation-of-gas agent included in the inflator 5 will burn. Part I part 6a of an air bag expands by the pressure of the gas which occurs at this time, and the lid 7 hooked on opening of a retainer 4 is carried out push outside, and contacts Crew's D knee region 2 (refer to drawing 4 ).

[0011] Subsequently, part II part 6b of an air bag develops and expands until it reaches the shell 9 of a guide peg along with Crew's D shin 8, and an air bag 6 fills the opening between the mutual opposed faces of Crew's D knee 2, the shin 8 and the shell 9 of a guide peg, and an instrument panel 1 (refer to drawing 5 ). Thereby, it is fixed so that the leg sections including the include angle of an ankle may not move. In this case, to having the vent hole for extracting internal pressure, in order that the air bag prepared in the steering wheel may prevent the rebound phenomenon, since immobilization of the leg section is the purpose, this air bag 6 holds an expansion condition until a car body stops completely.

[0012] By the way, the leg section cannot be followed [ that the include angle of an ankle is only fixed, and ] to deformation of a car body, but there is a possibility that the heel may be pinched by the car body. Then, as shown in drawing 6, while considering as the long hole of the upper and lower sides of the mounting hole 11 of the retainer 4 to the bracket 10 fixed to a car-body side in this invention The share ring bar 12 cut by the predetermined load is interposed in the connection of a retainer 4 to a bracket 10, and when a certain load F joins the sole, the share ring bar 12 breaks, the air bag 6 which expanded shifts to slanting facing up the whole retainer 4, and it is made to have moved (refer to drawing 7 ). Since an air bag 6 moves with the leg section 13 by this, with the include angle of an ankle held when the leg section 13 is thrust up by deformation of a car body, while the include angle of an ankle had been fixed, the leg section 13 can follow car-body deformation, and the load which joins the shin 8 is reduced suitably.

[0013]  
[Effect of the Invention] Thus, according to the configuration of claim 1 of this invention, since crew's ankle is restrained by the air bag at the time of a collision, an ankle does not need to be bent by force according to car-body deformation. And since the retainer of air bag equipment shifts and moves by the configuration of claim 2 when the excessive force of a direction of raising the leg section joins the sole, the compressive load which joins the shin in the condition [ having fixed the include angle of an ankle ] can be reduced suitably. Therefore, by this invention, since protection of the whole leg section is attained, the damage which the leg section receives at the time of a collision is reduced upwards, and great effectiveness can be done so.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] The outline side elevation of the circumference of the driver's seat to which this invention was applied.

[Drawing 2] The outline sectional side elevation of this invention equipment.

[Drawing 3] The perspective view of an air bag part.

[Drawing 4] The same side elevation as drawing 1 which shows the air bag's expansion middle.

[Drawing 5] The same side elevation as drawing 1 which shows the expansion condition of an air bag.

[Drawing 6] The important section perspective view showing the attachment condition of this invention equipment.

[Drawing 7] The explanatory view showing the condition that the force of a direction of raising the leg section joined the sole.

[Description of Notations]

- 1 Instrument Panel
- 2 Knee Region
- 3 Air Bag Equipment
- 4 Retainer
- 5 Inflator
- 6 Air Bag
- 7 Lid
- 8 Shin
- 9 Shell of Guide Peg
- 10 Bracket
- 11 Mounting Hole
- 12 Share Ring Bar
- 13 Leg Section

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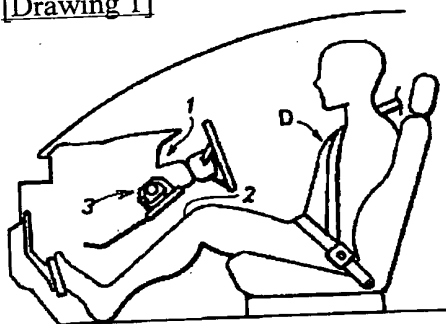
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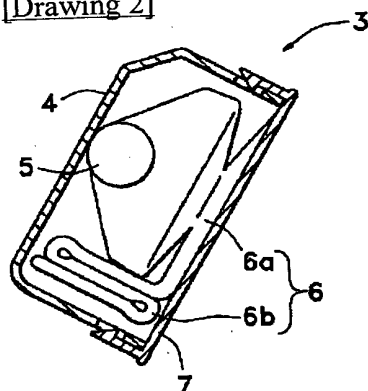
DRAWINGS

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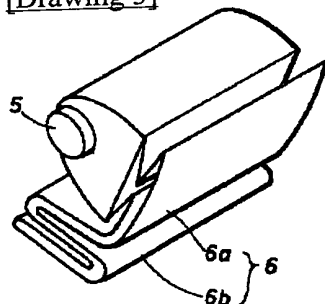
[Drawing 1]



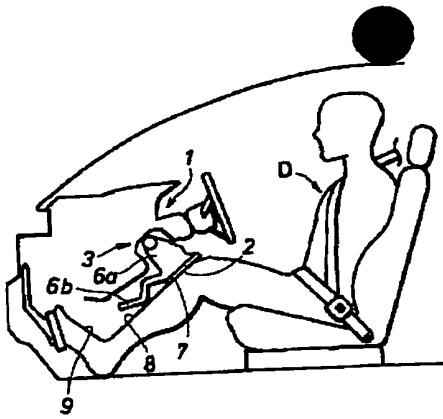
[Drawing 2]



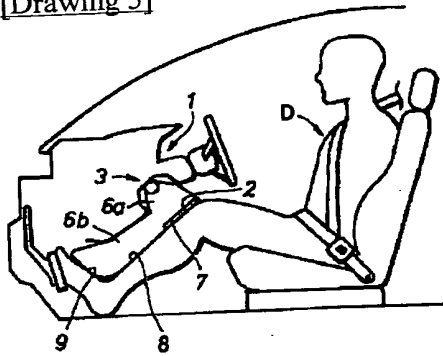
[Drawing 3]



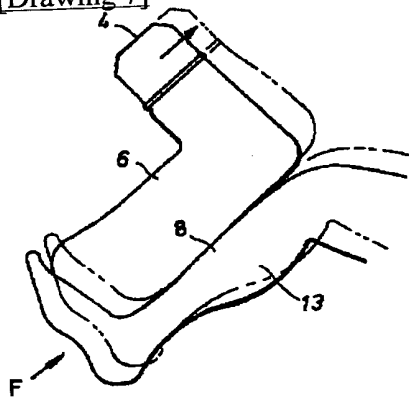
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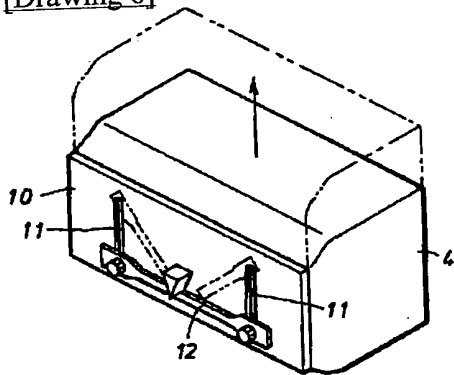
[Drawing 5]



[Drawing 7]



[Drawing 6]



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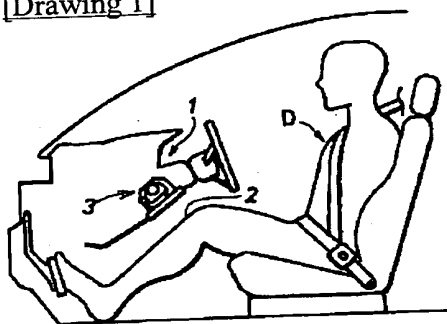
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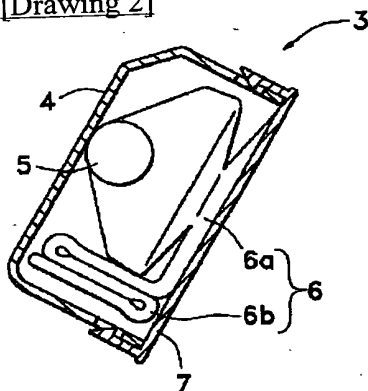
DRAWINGS

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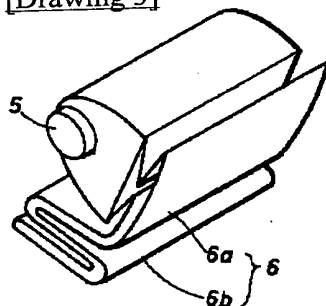
[Drawing 1]



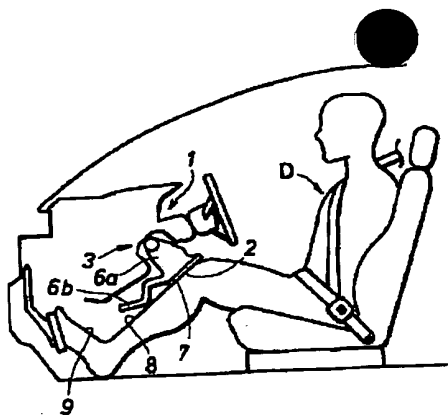
[Drawing 2]



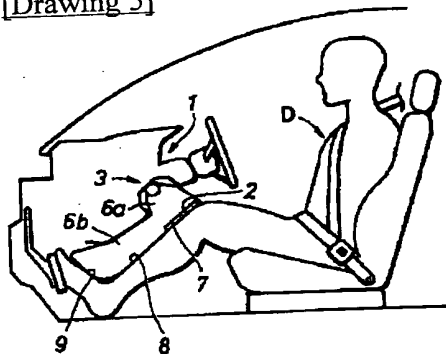
[Drawing 3]



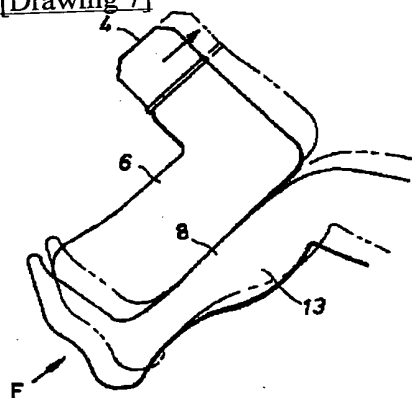
[Drawing 4]



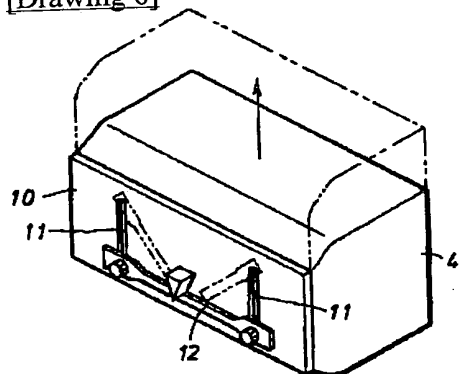
[Drawing 5]



[Drawing 7]



[Drawing 6]



[Translation done.]

(19)



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(72) Inventor: **YAMADA TAKAYUKI**

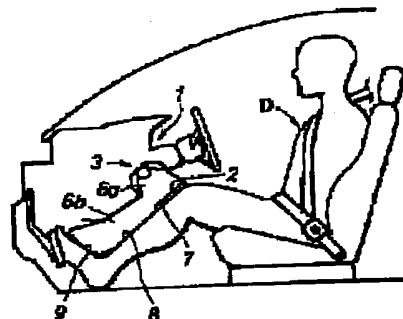
(54) **AIR BAG DEVICE**

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(57) Abstract:

**PROBLEM TO BE SOLVED:** To protect an occupant from his knees to shins and further to around ankles.

**SOLUTION:** An air bag device 3 which inflates in the event of car collision and constrains the movement of an occupant D, is equipped with a sack 6 (6a and 6b) inflating so as to fill the void between the mating surfaces of the occupant knees 2, shins 8 and insteps 9 and the instrument panel 1 of the car. Thereby the lower legs are prevented from directly colliding with the instrument panel by the inflated sack, and also the ankles are precluded from unreasonable bend as the angle between each instep and shin is fixed by the inflated sack. If in particular, the sack is formed as movable together with the lower legs while the ankle angle is held when a specified load is applied to the soles, the lower legs can make follow-up motions after deformation of the car body with the ankle angle remaining fixed even if the lower legs are thrust up by the deformation of the car body, so that the load applied to the shins can be released in favorable degree.



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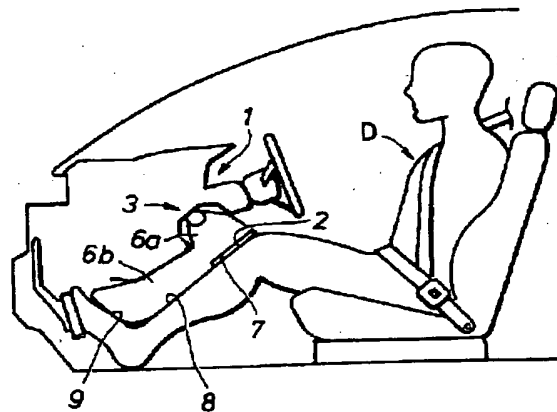
(74) 代理人 弁理士 大島 陽一

(54) 【発明の名称】 エアバッグ装置

(57) 【要約】

【課題】 膝から膈、そして足首近傍までを保護することのできるエアバッグ装置を提供する。

【解決手段】 車両の衝突時に膨張して乗員 D の移動を拘束するエアバッグ装置 3 を、乗員の膝 2、膈 8、及び足の甲 9 とインストルメントパネル 1 との互いの対向面同士間の空隙を埋めるように膨張する袋体 6 を備えるものとする。これによると、インストルメントパネルに乗員の下腿部が直接突き当たることが膨張した袋体によって防止されることはもとより、足の甲と膈との角度が膨張した袋体によって固定された形となるので、足首が無理に曲げられずに済む。特に袋体を、足裏に所定荷重が加わると、足首の角度を保持したまま下腿部 1 3 と共に移動可能なるものとするれば、車体の変形で下腿部が突き上げられたとしても、足首の角度が固定されたままで車体変形に下腿部が追従し得るので、膈に加わる荷重を好適に逃がすことができる。



## 【特許請求の範囲】

【請求項1】 車両の衝突時に膨張して乗員の移動を拘束するエアバッグ装置であって、

乗員の膝、膈、及び足の甲とインストルメントパネルとの互いの対向面同士間の空隙を埋めるように膨張する袋体を備えることを特徴とするエアバッグ装置。

【請求項2】 前記袋体は、所定荷重が足裏に加わると、足首の角度を保持したまま下腿と共に移動可能なものであることを特徴とする請求項1に記載のエアバッグ装置。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、車両の衝突時に膨張して乗員の移動を拘束するエアバッグ装置に関し、特に乗員の下腿部の保護を目的としたエアバッグ装置に関するものである。

【0002】

【従来の技術】車両の衝突時に慣性力で乗員が前方へ移動し、インストルメントパネルに膝を突き当てることがある。このような打撃から乗員を保護するために、インストルメントパネルの下面から膨出するエアバッグ装置が提案されている（特開昭48-5134号公報など参照）。

【0003】

【発明が解決しようとする課題】しかるに、実際の衝突事故にあっては、衝撃で車体の床が変形してペダルが突出するなどして足首が無理な角度に曲げられる、といった事例が見られるが、上記従来のエアバッグ装置は、剛体であるインストルメントパネルに膝が直接突き当たることを防止するクッション機能を得ることを主眼としているため、足首を衝突衝撃から保護することはできない。

【0004】本発明は、このような従来技術の欠点を解消するべく案出されたものであり、その主な目的は、膝から膈、そして足首近傍までを保護することのできるエアバッグ装置を提供することにある。

【0005】

【課題を解決するための手段】このような目的を果たすために、本発明においては、車両の衝突時に膨張して乗員Dの移動を拘束するエアバッグ装置3を、乗員の膝2、膈8、及び足の甲9とインストルメントパネル1との互いの対向面同士間の空隙を埋めるように膨張する袋体6を備えるものとした。これによると、インストルメントパネルに乗員の下腿部が直接突き当たるのが膨張した袋体によって防止されることはもとより、足の甲と膈との角度が膨張した袋体によって固定された形となるので、足首が無理に曲げられずに済む。

【0006】特に袋体を請求項2の構成、つまり足裏に所定荷重が加わると、足首の角度を保持したまま下腿部13と共に移動可能なものとすれば、車体の変形で下

腿部が突き上げられたとしても、足首の角度が固定されたまま車体変形に下腿部が追従し得るので、膈に加わる荷重を好適に逃がすことができる。

【0007】

【発明の実施の形態】以下、添付の図面に示された一実施例を参照して本発明の構成について詳細に説明する。

【0008】図1は、本発明が適用された運転席に乗員が着座した状態を示している。インストルメントパネル1における乗員Dの膝部2と対向する部分（ステアリングコラム近傍）には、本発明によるエアバッグ装置3が取り付けられている。このエアバッグ装置3は、基本構成はステアリングホイールに組み込まれる公知形式のものと同様であり、図2に示したように、箱状のリテーナ4と、リテーナ4内に収容されたインフレーター5及びエアバッグ6とからなっている。またリテーナ4の開口面は、インストルメントパネル1の下面と同一面となる平坦なリッド7で塞がれている。

【0009】エアバッグ6は、袋状をなし、通常は折り畳まれた状態でリテーナ4内に収容されている。エアバッグ6は、大別してインフレーター5に近い第1部分6aと、第1部分6aに連続する第2部分6bとからなっており、図3に併せて示したように、第1部分6aは概ね蛇腹状に折りたたまれ、第2部分6bはつづら折状に折りたたまれている。

【0010】次に本発明装置の作動要領について説明する。減速度センサ（図示せず）で車両衝突が検知されると、インフレーター5に組み込まれたガス発生剤が燃焼する。この時に発生するガスの圧力でエアバッグの第1部分6aが膨張し、リテーナ4の開口部に引っ掛けられていたリッド7が押し外されて乗員Dの膝部2に当接する（図4参照）。

【0011】次いで乗員Dの膈8に沿って足の甲9に達するまでエアバッグの第2部分6bが展開・膨張し、乗員Dの膝2、膈8、及び足の甲9とインストルメントパネル1との互いの対向面同士間の空隙をエアバッグ6が埋める（図5参照）。これにより、足首の角度を含めて下腿部が動かないように固定される。この場合、ステアリングホイールに設けたエアバッグが跳ね返りを防止するために内圧を抜くためのベントホールを備えているのに対し、このエアバッグ6は下腿部の固定が目的なので、車体が完全に停止するまで膨張状態を保持する。

【0012】ところで、足首の角度が固定されるだけであると、車体の変形に対して下腿部が追従できず、車体に踵が挟まれたりするおそれがある。そこで本発明においては、図6に示すように、車体側に固定されるブラケット10に対するリテーナ4の取付孔11を上下の長孔とすると共に、所定荷重で切断するシェアリングバー12をブラケット10に対するリテーナ4の接続部に介設し、ある荷重Fが足裏に加わるとシェアリングバー12が折れ、膨張したエアバッグ6がリテーナ4ごと斜め上

向きにずれ動くようにしてある(図7参照)。これにより、車体の変形で下腿部13が突き上げられた場合には、足首の角度を保持したままエアバッグ6が下腿部13と共に移動するので、足首の角度が固定されたままで車体変形に下腿部13が追従し得ることとなり、膈8に加わる荷重が好適に低減される。

【0013】

【発明の効果】このように本発明の請求項1の構成によれば、エアバッグによって乗員の足首が衝突時に拘束されるので、車体変形によって足首が無理に曲げられずに済む。しかも下腿部を持ち上げる方向の過大な力が足裏に加わった場合には、請求項2の構成により、エアバッグ装置のリテーナがずれ動くので、足首の角度を固定したままの状態に膈に加わる圧縮荷重を好適に低減することができる。従って、本発明により、下腿部全体の保護が可能となるので、衝突時に下腿部が受けるダメージを低減する上に多大な効果を奏することができる。

【図面の簡単な説明】

【図1】本発明が適用された運転席回りの概略側面図。

【図2】本発明装置の概略側断面図。

【図3】エアバッグ部分の斜視図。

\*【図4】エアバッグの膨張途中を示す図1と同様な側面図。

【図5】エアバッグの膨張状態を示す図1と同様な側面図。

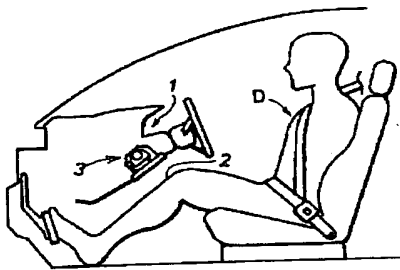
【図6】本発明装置の取付状態を示す要部斜視図。

【図7】下腿部を持ち上げる方向の力が足裏に加わった状態を示す説明図。

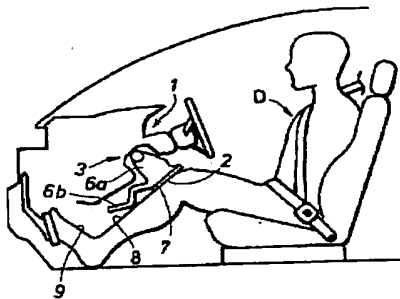
【符号の説明】

- 1 インストルメントパネル
- 2 膝部
- 3 エアバッグ装置
- 4 リテーナ
- 5 インフレーター
- 6 エアバッグ
- 7 リッド
- 8 膈
- 9 足の甲
- 10 ブラケット
- 11 取付孔
- 12 シェアリングバー
- 20 13 下腿部

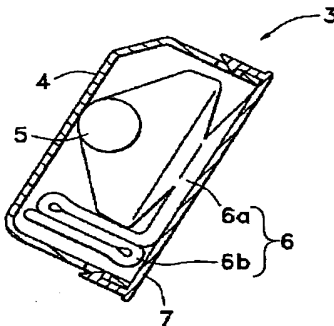
【図1】



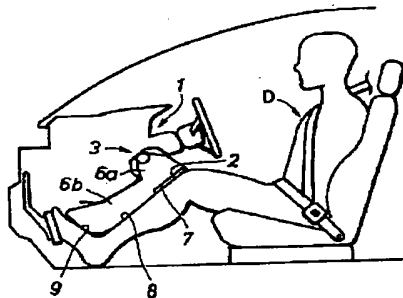
【図4】



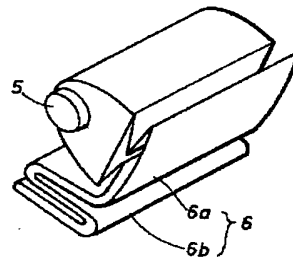
【図2】



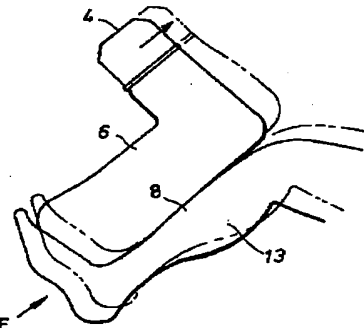
【図5】



【図3】



【図7】



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【図6】

